B.V. Skvortzov* & Mitsuzo Noda**: On species of a green flagellata of the genus *Chlorogonium* Ehr., Volvocineae, Chlorophyceae from Japan, Hong Kong and Brasil

スクボルツォフ B.V.・野田光蔵**: 日本・香港・ブラジル産の *Chlorogonium* 属（緑藻）の種類

Genus *Chlorogonium* Ehr., 1830 is a free swimming flagellata, very similar in shape to some green species of *Chlamydomonas* Ehr. It is distinguished from the latter genus in more or less fusiform cells in which the posterior end is pointed and the anterior more or less rostrate or rounded. This flagellata has a definite hyaline wall, 1-2 contractile vacuoles at the anterior end of cell and other vacuoles in different part of the cell are also common; chloroplast is green, containing one, two or several pyrenoids or lacking them entirely; nucleus is centrally located. Some species have a eyespot toward the anterior end of the cell; the two flagella at the anterior part are usually as long or short as the cell and are inserted close to each other; papilla is indistinct. Asexual reproduction is by longitudinal division of protoplast; zoospores are formed in the mother cell. Sexual reproduction of most species is by the fusion in pairs of equalized biflagellate cells. The type species of the genus is *Chlorogonium euchlorum* Ehr. Although 19 species are described in the present paper, about 40 species are known in Europe and N. America. Here is given the description of 3 new species from Japan, 7 from Hongkong and 9 from Brasil.

The type specimens are preserved at the Cryptogamic Section of Botanical Institute, São Paulo, Brasil.

Cultures

All samples collected in São Paulo and received from Japan and Hong Kong have been cultivated by B.V. Skvortzov each in glass cylinders filled with filter water and by the add of pepton. For fixing the cells of *Chlorogonium* osmium was used with good success.

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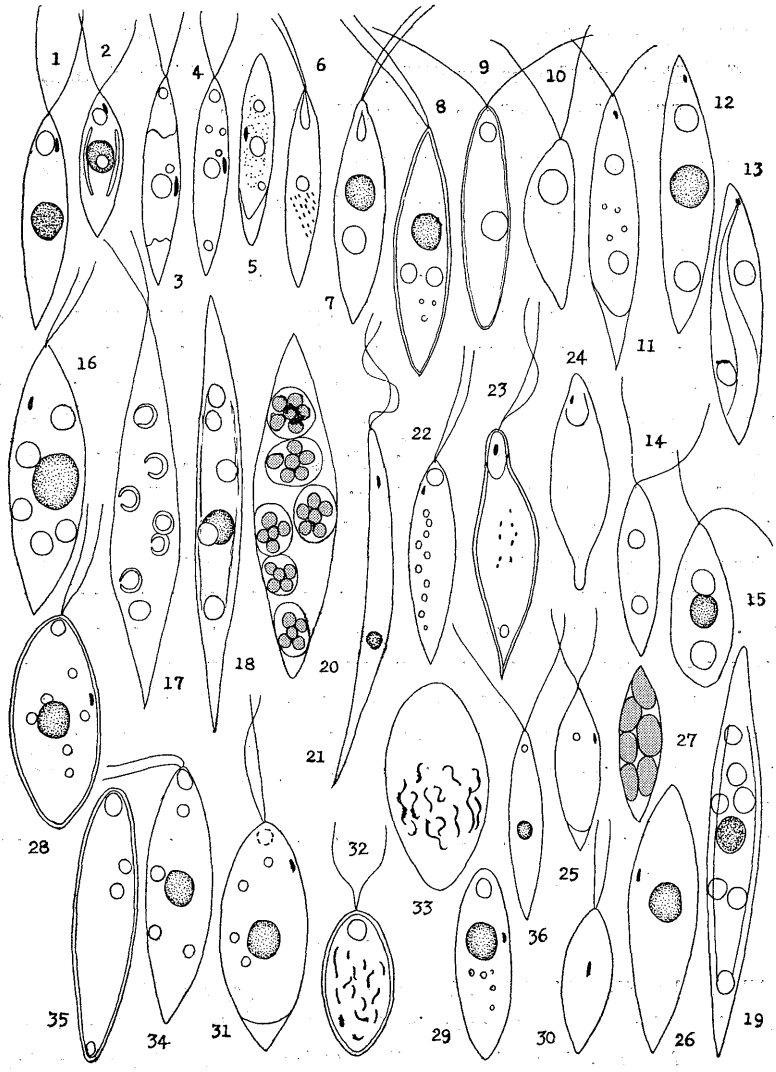

Fig. 1-2. *Chlorogonium chanii* 3-5. *Ch. anaerobica* 6. *Ch. spiralistriatum* 7-8. *Ch. subtropicale* 9. *Ch. astigmate* 10. *Ch. stentonii* 11-13. *Ch. aberdeenii* 14-15. *Ch. widdowsonii* 16. *Ch. euchlorum* 17-20. *Ch. stephenii* 21. *Ch. utricullariae* 22. *Ch. nodeana* 23-24. *Ch. alinii* 25-27. *Ch. matvienkoi* 28-30. *Ch. ellipsoideum* 31. *Ch. latilanceolatum* 32-33. *Ch. ovatum* 34-35. *Ch. sphagnicola* 36. *Ch. saupaulensis.*

Key to the species

1. Pyrenoid present 2
1. Pyrenoid lacking 11
2. Pyrenoid 1 3
2. Pyrenoid 2 or numerous 8
3. Eyespot present 4
3. Eyespot lacking 5
4. Eyespot anterior ..... 1. *Chlorogonium chanii*
4. Eyespot about the middle part of the cell ..... 2. *C. anaerobicum*
5. Cell membrane spirally striated ..... 3. *C. spirali-striatum*
5. Cell membrane hyaline 6
6. Pyrenoid posterior ..... 4. *C. subtropicale*
6. Pyrenoid central or super-median 7
7. Pyrenoid central ..... 5. *C. astigmate*
7. Pyrenoid super-median ..... 6. *C. stentonii*
8. Pyrenoid 2 9
8. Pyrenoid numerous 10
9. Eyespot present ..... 7. *C. aberdeenii*
9. Eyespot lacking ..... 8. *C. widdowsonii*
10. Eyespot present ..... 9. *C. euchlorum*
10. Eyespot lacking ..... 10. *C. stephenii*
11. Eyespot present 12
11. Eyespot lacking 16
12. Cell needle-shaped ..... 11. *C. utricularíae*
12. Cell narrow fusiform ..... 12. *C. nodeana*
12. Cells ±ellipsoid, broad lanceolate, ±acute from both ends 13
13. Anterior and posterior parts abruptly attenuate 14
13. Anterior and posterior parts ±broad, short acute 15
14. Eyespot on the top of the cell near the vacuole ..... 13. *C. alinii*
14. Eyespot between central nucleus and gula ..... 14. *C. matvienkoi*
15. Eyespot about the middle part of the cell near the nucleus ..... 15. *C. ellipsoideum*
15. Eyespot near the top of the cell near the gula ..... 16. *C. latilanceolatum*
16. Cells subovate, chromatophor ±reticulate ..... 17. *C. ovatum*
16. Cells fusiform to ±linear, chromatophor parietal 17

17. Cells fusiform, vacuoles numerous.....18. *C. sphagnicola*
17. Cells linear fusiform.....19. *C. saupaulensis*

Description of the species

1. **Chlorogonium chanii** Skvortzov, sp. nov. (figs. 1-2)

Cellula brevi vel longi fusiformis, cum apicibus attenuatis, 9-15×4 μ; flagella 1/2 cellulae longiora; chromatophoris parietalis; stigmate elongato prope vacuole contractio parte anteriore cellulae positae; pyrenoide centralis prope nucleus. Differt a *Ch. fusiforme* in stigmate apicale. Hab. in orysetis cum aqua impura, prope Hong Kong, leg. S. T. Chan, Aug. 12, 1965. The specific name honours Mr. S. T. Chan of Hongkong University.

2. **Chlorogonium anaerobicum** Skvortzov et Noda, sp. nov. (figs. 3-5)

Cellula fusiformis cum apicibus attenuatis, 13-15-18×2-3.7-6 μ; vacuola contractolis distincta; ceteri vacuoles 2 ab utroque latere chromatophoris, pyrenoide 1 in medio cellulae; stigmate oblongo prope pyrenoide; nucleus indistinctus; flagella 2 apice insertes, cellulae longitudine circa 1/3 plo longiore; chromatophoris dilute parietalis, per totam cellulae longitudinalis extendentibus vel parte posteriore reductum vel non nihil medianus. Differt a *Ch. neglectum* Pasch. in formae cellulae et stigmate prope pyrenoide postitum. Hab. São Paulo, Brasil, leg. B.V. Skvortzov, Mar. 2, 1963.

3. **Chlorogonium spirali-striatum** Skvortzov et Noda, sp. nov. (fig. 6)

Cellula fusiformis cum apicibus plus minus acutis, parte posteriore attenuatis cum apicem obtusis, 18.5×5.6 μ; vacuola contractolis magna, distincta, oblonga, parte anteriore prope flagellis posita; flagella fere 1/3 cellulae longiora; stigmate nullo; nucleus indistinctus; pyrenoide supre medianus; chromatophoris parietalis, viridis cum striis spiralis sinistro-dextrorsum positum. A *Ch. astigmate* Skv. sp. nov. differt in formam vacuolae, supra mediana pyrenoide et chromatophoris spirali-striatum. Hab. São Paulo, Brasil, leg. B. V. Skvortzov, Jan. 26, 1963.

4. **Chlorogonium subtropicale** Skvortzov (figs. 7-8)

Cellula fusiformis cum apicibus attenuatis et acutis, 18-30×7.4 μ; flagella 2, apice, 2/3-plo cellulae longioribus; vacuola contractolis pone; nucleus centralis; pyrenoide 1 vel 2 inter nucleus et apice posteriore positae. Differt per totam species in 1-2 pyrenoidibus posterioribus. Hab. in rivulis montanis cum aqua impura, prope Hong Kong, leg. S. T. Chan, Aug. 12, 1965.

5. **Chlorogonium astigmate** Skvortzov, sp. nov. (fig. 9)

Cellula brevi fusiformis cum apicibus brevi acutis, lateribus plus minus rotundatis, 7-9-11-14×3-4-5 μ; flagella 2, 2/3 plo cellulae longiora; stigmate nullo; pyrenoide et nucleus centrales; vacuola contractolis parte anteriore prope flagellis. Differt a *Ch. obliquum* Skv. et *Ch. minutum* Skv., *Ch. leiostracum* Str. et *Ch. tetragamum* Bohl in stigmate nullo. Hab. Hong Kong, leg. B.V. Skvortzov, Mar. 10, 1966.

6. **Chlorogonium stentonii** Skvortzov, sp. nov. (fig. 10)

Cellula fusiformis obliquus latiore ad anteriorem cum apice et postire plus minus acutis, 18×8 μ; flagella 2, 2/3 cellulae longiora; stigmate nullo; vacuola contractolis prope flagellis, indistinctis; pyrenoide magnum supra medianus; nucleus fere centralis et indistinctis; chromatophoris viridis. Affinis *Ch. astigmate* Skv. Hab. in rivulis cum aqua impura, prope Hong Kong, leg. S. T. Chan, Aug. 12, 1965. The specific name honours Prof. Dr. O.H. Stenton of Hong Kong University.

7. **Chlorogonium aberdeenii** Skvortzov, sp. nov. (figs. 11-13)

Cellula fusiformis cum apicibus attenuatis et acutis, parte mediane cum lateribus convertis, 30-33×9 μ; flagella 2, 1/4 cellulae breviora; stigma minor fere apicale; nucleus centralis, vacuola contractolis non nihil; cauda cellulae hyalina. Differt a *Ch. elongatum* Dang in stigmate minute, apicale et in marginibus cellulae protractis. Hab. in rivulis montanis cum aqua impura, prope Hong Kong, leg. S.T. Chan, Aug. 12, 1965.

8. **Chlorogonium widdowsonii** Skvortzov, sp. nov. (figs. 14-15)

Cellula perfecte lanceolata vel spathulata cum parte posteriore late cuneata; flagella 2, 2/3 cellulae longiora; nucleus centralis; stigmate nullo; pyrenoide 2, cellulae 14-18×7.4 μ. Differt a *Ch. aculeatum* Pasch., *Ch. acuminatum* Skv. et *Ch. elongatum* Dang in stigmate nullo. Hab. in rivulis montanis cum aqua, prope Hong Kong, leg. S. T. Chan, Aug. 12, 1965. The specific name honours Prof. Dr. Thomas B. Widdowson of Hong Kong University.

9. **Chlorogonium euchlorum** Ehr.! (fig. 16)

Cells perfect lanceolate, acute on both ends, 37×13 μ; flagella 2, about 3.5 times shorter the cell; chromatophore in form of green plate close to the periplast; eyespot large and long in anterior part of the cell; pyrenoids 5; nucleus central and large; contractile canal distinct; contractile vacuoles small and numerous; latior quam typo. Hab. in fauling stream near Hong Kong.

10. **Chlorogonium stephenii** Skvortzov, sp. nov. (figs. 17-20)

Cellula elongato-fusiformis cum apicibus elongatis et protractis, 37-74×9-15 μ;

flagella 4–5 cellulae breviora; stigmate nullo; nucleus fere centralis, pyrenoide 5–7–10, zoospores 5–6 in cellulae. Differt a *Ch. euchlorum* Ehr. in cellulis astigmatis. Hab. in rivulis cum aqua impura, Aberdeen, prope Hong Kong, leg. S.T. Chan, Aug. 12, 1966. The specific name honours Prof. Dr. R. C. Stephens of Hong Kong University.

11. **Chlorogonium utricularіae** Skvortzov et Noda, sp. nov. (fig. 21)

Cellula spiniformis cum parte anteriore abruptis, parte posteriore gradatim attenuatis et acutis, 44.4–48×3.7–4 μ; flagella 2, fere 1/3 cellulae longiora; stigmate prope flagellis; vacuola contractolis indistincta; nucleus infra medium; pyrenoide nullo; chromatophoris viridis, granulatis cum vacuola contractolis indistinctis. A *Ch. minutum* Playf. flagellis brevioribus et chromatophoris granulatis differt. Hab. in stagno inter *Utricularia* sp., Parque de Estado, São Paulo, Brasil, leg. B. V. Skvortzov, Dec. 11, 1962.

12. **Chlorogonium nodeana** Skvortzov, sp. nov. (fig. 22)

Cellula lanceolata vel fusiformis cum apicibus attenuatis et acutis, 18–20×7.5 μ; flagella 2, 2/3 cellulae longiora; nucleus centralis; vacuola contractolis magna, prope flagellis positis; stigmate oblongo, rubro, prope gulae posito; pyrenoide nullo; chromatophoris parietalis, viridis, per totam longitudinem cellulae extendentibus cum granulis rubrobrunneis, longitudinali et vacuolis contractolis positis. Hab. in stagnis cum *Mayacca sellowiana* Kunth, Parque de Estado, São Paulo, Brasil, leg. B. V. Skvortzov, May 23, 1966. The specific name honours Prof. Dr. M. Noda of Niigata University.

13. **Chlorogonium alinii** Skvortzov et Noda, sp. nov. (figs. 23–24)

Cellula late fusiformis cum apicibus gradatim vel gobito acutis, 23–30–37×9–10 μ; flagella 2, fere 1/2 cellulae longiora; stigmate et vacuola contractolis apice; chromatophoris granulatis sine pyrenoide; nucleus lateralis, viridis, in medio cellulae positus. Differt a *Ch. nodeana* Skv. in cellulis latioribus et stigmate cum vacuolis positis. Hab. inter *Sphagnum* sp., São Paulo, Brasil, leg. V. N. Alin, May 20, 1965. The specific name honours Mr. V. N. Alin, a naturalist of São Paulo.

14. **Chlorogonium matvienkoi** Skvortzov et Noda, sp. nov. (figs. 25–27)

Cellulae latae fusiformes vel perfecte lanceolatae, 30–37×11–18 μ; flagella 2, fere 1/2 cellulae longiora; vacuola contractolis adest vel abest; gula indistincta, vacuolae contractolis non nihil, 1–2 prope flagellis, ceteri prope stigmate; stigmate bacillariformis, rubro, lateralis parte anteriore cellulae; nucleus fere centralis; pyrenoide nullo; chromatophoris parietalis; cauda hyalina sine chromatophoris; zoosporis 6.

Differt a *Ch. gracile* Matv. formam cellulae, chromatophoris bilateralis, stigmate bacillariformibus, supra medium cellulae positum et flagella 1/2 cellulae longiora. Hab. 1) inter mosses et hepatica in cultura, prope São Paulo. 2) in stagnis montanis, Parque de Estado, S. Paulo., leg. B.V. Skvortzov, May 16, 1966. The specific name honours Dr. A. M. Matvienko of Charkov University, USSR.

15. **Chlorogonium ellipsoideum** Skvortzov et Noda, sp. nov. (figs. 28-30)

Cellulae ellipsoideae vel lanceolatae cum apicibus late acutis, 11-18-25-33×5-11-14 μ; flagella fere 1/2 cellulae longiora; stigmate oblongo fere mediano, prope nucleo; vacuola contractolis sphaerica, conspicua vel inconspicua; chromatophoris viridis, partietalis sine pyrenoide; nucleus centralis. Affinis *Ch. latilanceolatum* Skv. et Noda sp. nov. cum stigmate prope nucleus positae. Hab. in stagno prope Kuroda, Matsue, Japan, lego M. Akiyama, May 10, 1966.

16. **Chlorogonium latilanceolatum** Skvortzov et Noda, sp. nov. (fig. 31)

Cellulae late ellipsoideae vel late lanceolatae cum apicibus plus minus attenuatis et acutis, 20-25 μ lg.; flagella fere 1/2 cellulae longiora, gula sphaerico, conspicua vel indistincta; vacuolae contractolia 2-4 (5) in totam cellulae positae; stigmate elongato, rubro, parte anteriore inter gulae et nucleus centralis positis; chromatophoris viridis, parietalis, posteriore rectractum, sine pyrenoide. Affinis *Ch. ellipsoideum* Skv. et Noda. Hab. 1) in oryzetis prope Kuroda, Matsue, Japan; 2) prope Kuroda, Matsue, in lacu, lego M. Akiyama, May 10, 1966.

17. **Chlorogonium ovatum** Skvortzov et Noda, sp. nov. (figs. 32-33)

Cellulae late-ellipticae vel subovatae cum apicibus late attenuatis et acutis, 12-14-18-26-44×6-15 μ; flagella fere cellulae longiora, vacuola contractolis distincta; chromatophoris viridis, reticulatis, sine pyrenoide et stigmate; vacuola contractolis non vidi. Differt a *Ch. ellipsoideum* et *Ch. latilanceolatum* in chromatophoris reticulatis et astigmate. Hab. in stagnis prope Kuroda, Matsue, Japan, lego M. Akiyama, May 10, 1966.

18. **Chlorogonium sphagnicola** Skvortzov et Noda, sp. nov. (figs. 34-35)

Cellula fusiformis, 10-18-20-26-30-37×7.4-11 μ, parte anteriore attenuatis et obtusis, parte posteriore plus minus acutis; flagella 1/2-2/3 cellulae longiora, vacuola contractolis sphaerica et distincta prope flagellis; vacuola contractolia 2-3 parte anteriore et posteriore disposita; stigmate nullo; nucleus fere centralis; chromatophoris viridis, parietalis et granulatis. Affinis *Ch. nodeana* Skv. et *Ch. alinii* Skv. et Noda in cellulis astigmate. Hab. inter *Sphagnum* sp. prope São Paullo, Brasil, leg. V. N. Alin, May 15, 1966.

19. **Chlorogonium saupaulensis** Skvortzov et Noda, sp. nov. (fig. 36)

Cellula angusto-fusiformis cum apicibus acutis, 34–38 μ lg.; flagella 2, 2/3 cellulae longiora; stigmate et pyrenoide nullo; nucleus distinctus, fere centralis; chromatophoris partietalis, viridis, sine pyrenoide. Differt a *Ch. sphagnicola* in cellulis angustioribus et longioribus. Hab. in stagnis, Parque de Estado, São Paulo, Brasil, leg. B.V. Skvortzov, May 17, 1966.

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著者らは日本・香港および南米ブラジル産の *Chlorogonium* 属（緑藻）の 19 種について記載した。そのうち 18 種は新種である。

○花色異品（浅井康宏） Yasuhiro ASAI: Some new forms of Japanese plants (2)

1. **オトメリンドウ**(新称) オヤマリンドウ *Gentiana makinoi* Kusnezow は本州中部の高山ないし亜高山帯に広く分布する多年草であって，時に向陽草地に大群落を成して生じていることがある。従来，本種の変りものとしてはシロバナオヤマリンドウ *G. makinoi* form. *albiflora* Nakai ex Hara in Journ. Jap. Bot. **21** (1・2): 19 (1947) が知られていた。一方，筆者は1963年8月，長野県下高井郡志賀高原・田の原付近におびただしく生育していた本種の群落中に，かなりの数の淡桃色花をつけたものを見出した。全草淡緑色を呈し，藍紫色花をつけた母種に比べ，清そ，かれんな感じを与える。これをオトメ(乙女)リンドウと名付け，次のように記載しておきたい。

Gentiana makinoi Kusnezow form. **rosea** Asai, f. nova

Corolla albo-rosea. Planta toto viridis.